



	Setting the scene: Global challenges for the battery revolution
09:45 - 10:25	Keynote, [REDACTED] <i>Advanced Lithium Battery Technology team at Argonne National Laboratory (USA)</i>
10:25 - 11:15	Panel discussion, moderated by [REDACTED] <i>Strategic Development, Batteries, SINTEF</i> , with: <ul style="list-style-type: none"><li>• [REDACTED] <i>Argonne National Laboratory (USA)</i></li><li>• <i>Thomas Skordas, Director of the Digital Excellence and Science Infrastructure, EC DG-CNECT</i></li><li>• [REDACTED] <i>Battery 2030+</i></li><li>• [REDACTED] <i>SAFT</i></li><li>• [REDACTED] <i>UMICORE</i></li><li>• [REDACTED] <i>EUCAR</i></li></ul>

*Welcome to everyone and getting seated 2-3'*

Thank keynote speaker [REDACTED] and welcome him to the panel

Welcome others to join the panel

**Mr Thomas Skordas**

Director of the Digital Excellent and Science Infrastructure at the European Commission DG CNECT

[REDACTED]

[REDACTED] **Battery 2030+**

[REDACTED]

Title: [REDACTED] **SAFT**

[REDACTED]

Title: [REDACTED] **Government Affairs Electromobility Projects, Northern Europe, Japan at Umicore**

[REDACTED]

[REDACTED]

Title: [REDACTED] **European Council for Automotive R&D (EUCAR)**

Brief introduction by [REDACTED] – while all the speakers are getting settled – 1'

Our title this morning is Global challenges for the battery revolution, however before we address challenges, I would invite you to take a glance back in the rearview mirror. 50 years ago mankind landed on the moon with less computing power and technology that is in your typical mobile phone today. 30 years ago mobile phones were essentially car phones with huge batteries, today the battery is not the limiting factor on mobile phones weight and size, rather the dexterity of our hands related to the size of the screen.

So now let's now, set off on a vision of the future 25 to 30 years from now. Our energy system, transport systems, homes, our food productions and even our personal health and well-being will be influenced by the transitions taking place whether they be driven by the need to halt climate change or the enhancement of our society through new digital solutions.

Different areas that the batteries will be used **Setting a vision for the future expressing how batteries could / will facilitate our society – Show it is a key enabling technology**

**1. Topic for discussion : Why is battery development important globally and in particular for Europe**

**Mr Thomas Skordas;** Why in your view are batteries of great important for Europe and How is this importance reflected in the new European Commission's priorities?

- Batteries are essential for the successful transition from a fossil fuel based economy to a carbon-neutral economy with clean and renewable energy at the core.
- Batteries are becoming essential to many sectors and European industries. In the automotive sector, they are now becoming a critical component of light weight electric vehicle particularly suited for short distance commuting (representing 40% of their value and a global market of 250B€). This is a sector where massive adoption is expected in the few years ahead driven by CO2 emission regulation in particular in urban environment. From the 5M unit today we will move to up to 200M electric vehicles within ten years according to IEA forecast.
- Europe need to master battery technology and their manufacturing for ensuring the long term competitiveness of European automotive industry. As a main energy storage source, it is important for Europe not to depend exclusively on non European provider. It should develop a strong European Battery industry providing us technological autonomy and sovereignty on a critical resource for our future.
- Batteries are also important in other sectors:
  - In Energy, they are increasingly needed to stabilise a grid network and accomodate for an increasing share of intermittent and distributed renewable energy sources. They provide large capacity for short-term stationary storage.
  - They could also be part of the solution for electrification of other transport sectors, like aviation, maritime and heavy duty vehicle, possibly in competition or combination with other technologies like hydrogen.

- They are also present in many other tools and devices surrounding us like IT equipment, medical equipment, yellow machines, gardening tools, new form of urban mobility..), including more futuristic ones like robots and drones.
- Rightly so, they have been put at the top of European agenda under Juncker Commission and they are now part of the European Green Deal, proposed by the new Commission with the ambitious goal of achieving a carbon-neutral Europe by 2050.

█; Since the battery industry is so important, won't the industry invest in much of its own R&I? Why does the European battery industry in particular need such long term initiatives such as Battery 2030+?

█ –What do you think the R&I (Universities and research institutes) community can offer that is of greater value, than what companies themselves can develop in-house?

█ How do you see the balance between research in industry and the R&I community?

## **2. Topic for discussion: Why prioritise investment in Battery research over other technologies**

█ we now see the automotive sector committing to producing EV and investing strongly in battery technology.

However, there are some strong voices in the Hydrogen sector saying now is the time for Hydrogen and there are various announcements relating to Hydrogen, whether it be blue or green, what impact do you see Hydrogen having on the automotive sector?

**Mr Thomas Skordas:** What is your view on the alternative technologies to batteries? How is the EU Commission approaching the support of the variety of technologies?

- Batteries are clearly not the only solution for energy storage. They are also not suited for a number of applications and other storage technology like hydrogen and other synthetic fuels are certainly relevant. Hydrogen is a clean technology that provides high autonomy, particularly suited for long distance driving and heavy duty vehicle (trucks). It can also be relevant for decarbonisation of other sectors like maritime or aviation which are also carbon-intensive. Other technologies are also relevant for stationary storage, like hydro, thermal, chemical. Each have their advantages and they are somehow complementary solutions. Europe is investing in various solutions and will continue to do so with a clear priority on hydrogen and battery.
- For light vehicle, battery is already market-ready and fit for purpose. Adoption is already happening all around the world with all major OEM announcing many new models to come in the 5 years ahead. It will be tough for hydrogen to come back here as the cost of switching to new technology is quite high and OEM will need to get pay-back on their heavy investment in transition to electric car.

- Europe has been investing heavily in development of hydrogen and fuel cell technology. A joint technology initiative is supporting the European effort for maturing this technology since 2008. Under H2020, the joint undertaking on Hydrogen had a total budget of 1.3 B€, half funded from EU budget (665M€).
- However, the take-up of this technology is slower due to a number of factors, including lower efficiency of hydrogen production (today, you need more electricity for running a car with hydrogen than with a battery if you include the full lifecycle, including production of H<sub>2</sub>), lack of infrastructure for hydrogen storage and distribution (only 2 spot in Belgium), use of rare raw material in fuel cell (like platinum) and uncertainty in the longevity of fuel cells.
- It should be noted that China is also pursuing a double approach based on battery and hydrogen. It is leading in battery and in electric vehicle adoption (half of the 5M EV on the market today are sold in China) but it has also announced ambitious plans for supporting hydrogen for transport. First hydrogen car on the mass market are offered by Asian company (Toyota and Hyundai).
- European automotive industry could quickly be lagging behind if it does not invest also in hydrogen technology. Audi has recently announcing reinforcing its effort on this tech. Europe need also to invest in establishing a proper hydrogen distribution network.

\_\_\_\_\_ this is the third time we have seen a major effort to launch the EV's industry into the mainstream, the first was in the 70's and the second in the 90's. What changes have occurred that reassure you that the transition will work this time and how can we be sure that batteries are the solution for transport? How will innovative battery R&I ensure this?

### 3. Why now?

\_\_\_\_\_ ; Following up from the earlier question, Do you think the battery and automotive industries are demonstrating enough commitment that they will now succeed in getting EV's in the mainstream.

\_\_\_\_\_, earlier there has been large scale research initiatives in the US, are there some lessons we can learn from your experience to ensure we cultivate the maximum benefit for industry uptake of Battery R&I developments?

Do you believe that there is there the same drive in the US, as we have in Europe to build giga factories and at the same time to drive battery research forward? Politically and in industry ?

\_\_\_\_\_, you have been working and leading many researchers in the battery field for quite a few years now, there have been many advances, mostly incremental improvements. Why do you see now as a key time to push for low TRL battery research ?

\_\_\_\_\_, you are working in the USA and can you give us a feel for where the debate in the US is on this topic?

Do you believe Europe can be competitive in battery research on the global stage?

#### 4. What?

**Mr Thomas Skordas:** From the EU Commission perspective, we know there is a lot of support for both battery R&I and the development of the industry, can you give us an overview perspective to the several instruments which are currently being prepared?

- The Commission has mobilised within the Strategic Action Plan on Batteries all the instruments it has in support of the establishment of a European battery industry. This is the first example of a comprehensive plan in support of a complete industry value chain (from mining to cell and battery manufacturing, to re-use and recycling) addressing:
  - Policy & Governance: Mobilising all actors across Europe (Member States, Industry, Research), establishing an industry led battery alliance & establishing an open and inclusive governance within the ETIP Batteries Europe. Stimulating national initiatives in many countries including, Germany, France, Sweden, Eastern countries (Czechia, Poland, Slovakia) and several trans-national collaborations. E.g. Earlier this year, Germany announced up to 1 billion investment in this sector and France announced 0,7 billion.
  - Financing instrument in support of short term deployment of EU battery manufacturing capacity: Invest EU (financing to NorthVolt 50 million), 2 IPCEI in preparation (one already submitted) to enable large scale support from MS to project of common interest for first deployment of innovative battery technologies in Europe.
  - Regulation and standard: E.g. preparing regulation for minimum performance and sustainability criteria for battery to operate in a circular economy.
  - Research, innovation and skills: Mobilising extra funding under Horizon 2020 (250 million in 2019-2020) and preparing new plans for Horizon Europe (including a proposed battery partnership), Smart specialisation by establish inter regional partnership on battery (ERDF); preparing a plan for addressing skill gaps
- This unique 'industry value chain' approach will very likely inspire action at European level in other technologies critical for Europe industrial autonomy and technical sovereignty. A topic also high on the agenda of the new Commission.

**[REDACTED]:** What approach could Europe take to battery R&I that will differentiate us from the rest of the world?

**Id like to open this question to the rest of the panel–**

**[REDACTED], - point out strengths of different regions of world, etc, etc – Comments from others welcome)**

**(Mr Thomas Skordas – strong position globally in digitisation, which can help lift R&I in field of batteries)**

Europe should play on its assets:

- Adopt a comprehensive strategy addressing all aspects as highlighted earlier (see above)
- Being fast, think both short term deployment and long term competitive advantage
- For the long-term, rely on our strength and we have many

- European collaboration around joint research roadmap and targets
- Mobilise significant research funding (mainly public for low TRL) both at EU and national and regional level.
- Mobilise our excellence in R&D and inter-disciplinary research: lots of research lab in electro-chemistry and excellence in digital technologies and material research.
- Leading edge research infrastructure (synchrotron, HPC, experimental facilities)
- Building on our digital technologies: HPC, excellence in modelling, simulation and so called 'deep AI' technologies.
- Cooperate with the many industry actors (even if we are lagging behind in cell manufacturing, we have strong actors in mining and materials, battery packs and integration in systems, recycling) in Europe. Strong market demand and cooperation with the world-leader in automotive sector (and automotive suppliers) but also leading in green and renewable energy grid.

## **5. Topic for discussion: How do we address sustainability**

██████████ - One of the arguments thrown up against batteries is concerning sustainability due to the materials which are utilised. How do we ensure environmental protection and sustainability in the batteries materials we use? How can the R&I contribute to this?

██████████ – At SAFT what is your view and strategy on sustainability in the battery production process? As a battery cell producer what is top on your wish list?

██████████ – Battery 2030+ focuses on very low TRL levels, so how does it address sustainability?

██████████ sustainability appears to be a stronger focal point in Europe than in some other regions of the world. In your opinion how can a region which prioritises sustainability ensure that it is globally competitive? Can research have a significant impact on achieving both?

## **6. Topic for discussion: How do we ensure that R&I developments reach the industry**

██████████ – From the battery materials producers point of view, how can the R&I community best ensure that the developments made are implementable and provide competitive advantage to the industry.

██████████ – The Battery 2030+ program will focus on low TRL developments, what mechanisms do you see to ensure that the developments are implemented and taken into the industry in a timely manner? – (Batteries Europe ETIP, SME's etc)

**Mr Thomas Skordas** – What has been your experience regarding the transfer of low TRL innovations into the industry domain with other technologies such as quantum computing and graphene for example?

- Traditionally Europe is not as good as for instance the US with regards to innovation. This is the case in particular in the digital sector that is today largely dominated by the US. Both cultural issues (risk averse) as well as systemic issue play a role (having the right supporting framework for research and market take-up e.g. VC, DARPA model for research, role of defence).

- In the digital sector, EU cannot rely on digital champion as the US is doing for investing in high risk research. For instance in the field of quantum technologies, Google, Microsoft and IBM are very active and heavily investing in the race for quantum supremacy (first quantum computer exceeding classical computing capability).
- But Europe has excellence in Quantum. We have been supporting this field at early stage at EU level, starting 20 years ago. Thanks to that we have a strong research community, acknowledge by several Nobel prizes. We need now rip the benefit by transforming this into an industrial success. The situation in Graphene (and 2D material) is somehow similar. We have excellence that we need to convert in innovation and industry success.
- In Europe, we need to compensate lack of digital champion with higher intervention of public funding and by putting in place the right research, innovation and industry take-up support framework.
- This is what we do in Graphene and in Quantum, where we have launched 1B€ flagship initiatives to bring technology to higher TRL for industrial take-up. Under Horizon Europe, these efforts will be continued. In the case of Quantum, it will be complemented by ambitious deployment activities under the new Digital Europe Programme for preparing the deployment of a secure Quantum communication network, paving the way to a Quantum Internet. In Graphene, we are deploying a shared graphene pilot line that will provide the electronic components necessary for graphene applications in the ICT sector.
- To ensure industrial relevance, we need to get industry on board at early stage, not only by fixing targets but also by cooperating in agenda making and progressively by direct involvement in R&D project. In Graphene flagship, we gradually increase cooperation with industry players by open call for developing sector specific solutions (e.g using graphene in the energy sector for improving battery material (e.g use of graphene in battery coin) and for super capacitor).
- We need also to efficiently support our rich high tech SME landscape. New initiative like the EIC can help take up of new technologies by high-tech SME and their scaling up.
- Closer to market, we can mobilise our panoply of instrument, like Invest EU for providing financial grants or the IPCEI projects for state aid derogation for MS support for first deployment of new technologies. We have done it successfully in micro-electronic and we are now doing it in battery.

7. **All** : Could you formulate in a **short** sentence what the primary research needs are? What 2 improvements to battery technology would be the most impactful.

– Christmas wish list...

**Thomas**

We need high performing, safe and sustainable battery technologies that can deliver to the diverse sectorial needs (in particular transport and stationary storage) in short and long term for a successful transition to carbon-neutral Europe by 2050.

- Safety, sustainability
- Power and energy density

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8. **What return for investment and impact do we expect to see resulting from investment in Battery R&I?**

**Mr Thomas Skordas**, what does the EU Commission expect to be the result of their focus and investment in Battery R&I?

- The goal of Europe is clear. We want battery 'made in Europe'. We want to establish a competitive European battery industry to have Europe sovereignty and technological autonomy on this capability critical to its future. It is also critical for maintaining our industrial leadership in the automotive sector. From a cell manufacturing market share of 3%, Europe would like to get to 7 to 25% within ten years to become a significant player.
- To succeed we need to work on all elements at the same time: research, innovation and industrial deployment.
- Battery 2030 is one important element. Its role is to reinforce the long term competitiveness of Europe in this sector by delivering a new generation of high performing batteries truly 'invented in Europe'. By mobilising the power of digital technologies, Europe can leapfrog technology developments and accelerate the emergence of high performing batteries necessary to reach a carbon-neutral Europe by 2050. We are not the only looking at using digital technologies to get better batteries, but the field is still very much unexplored and if we act quickly and ambitiously we can really take the lead.

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-----2 QUESTIONS FROM AUDIENCE -----  
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